MARKED UP VERSION SHOWING CHANGES MADE:

Please amend claims 1, 2, 9, 12, 13, 14, 15, 21, 25, 27, 28, 32, 39, 40, 41, 44, 47, 48, 49, 59, 64 and 67-68 as follows:

1. (Amended). A cross-incompatible maize plant that exhibits a Teosinte Crossing Barrier (TCB) trait, wherein said cross-incompatible plant comprises [comprising] a TCB [trait] gene cluster that encodes for the TCB trait and further wherein said plant is derived by breeding with a maize plant that contains a TCB gene cluster and is grown from seed of W22-TCB deposited as ATCC No. PTA-1601.

2. (Amended). The cross-incompatible plant of claim 1 wherein said plant fails to set seed when pollinated by plants lacking the TCB [trait] gene cluster but sets seed when pollinated by plants carrying the TCB [trait] gene cluster.

9. (Amended). [The cross-incompatible maize plant of claim 9 further comprising a gene cluster within its genome wherein said gene cluster] A cross-incompatible maize plant that exhibits a Teosinte Crossing Barrier (TCB) trait, wherein said cross-incompatible plant comprises in its genome a TCB gene cluster, wherein the TCB gene cluster is located on the short arm of chromosome 4 between map units 40 and 85.

12. (Amended). The cross-incompatible maize plant of claim [10] 11 wherein said *Tcb* locus comprises at least one gene which encodes for a silk effect function in said plant.

13. (Amended). The cross-incompatible maize plant of claim[s 10 or 12] 11 wherein said *Tcb* locus comprises at least one gene which encodes for a pollen effect function in said plant.

14. (Amended). The cross incompatible maize plant of claims [9, 10] 11, 12 or 13 further comprising at least one modifier gene within its genome.

15. (Amended). A cross-incompatible maize plant comprising a TCB [trait] gene cluster within its genome and which (1) fails to set seed when pollinated by plants lacking the TCB [trait] gene cluster but sets seed when pollinated by plants carrying the TCB [trait] gene cluster; and (2) maintains functional pollen and sets seed when pollinated by itself or causes other maize plants to set seed when pollinated by said plant.

21. (Amended). The cross-incompatible maize plant of claim 15 [further comprising a gene cluster within its genome] wherein said gene cluster is located on the short arm of chromosome 4 between map units 40-85.

25. (Amended). The cross-incompatible maize plant of claim[s] 22 [or 24] wherein said *Tcb* locus comprises at least one gene which encodes for a pollen effect function in said plant.

27. (Amended). A cross-incompatible maize plant comprising a TCB gene cluster with its genome [trait and] wherein said TCB [trait] gene cluster is [derived] from plant W22-TCB, and further wherein seed of W22-TCB has been deposited as ATCC No. PTA-1601.

28. (Amended). The cross-incompatible maize plant of claim 27 [further comprising a gene cluster within its genome] wherein said gene cluster is located on the short arm of chromosome 4 between map units 40-85.

32. (Amended). The cross-incompatible maize plant of claim[s] 29 [or 31] wherein said *Tcb* locus comprises at least one gene which encodes for a pollen effect function in said plant.

39. (Amended). A process for obtaining an inbred maize plant, which when crossed with a second inbred maize plant, produces a hybrid maize plant which is cross-incompatible and contains a TCB gene cluster within its genome [trait], the process comprising the steps of:

a) selecting a first donor parental maize plant from a population of maize

plants, wherein said first donor parental maize plant is cross-incompatible and contains a TCB gene cluster [trait];

b) crossing said selected first donor parental maize plant with a second parental maize plant containing genes which encode for desirable traits in hybrid combination;

c) collecting the seed resulting from the cross in step b);

d) planting and growing the seed collected in step c) under plant growth conditions;

e) screening the resulting plant population for the presence of the TCB [trait] gene cluster identified in step (a); and

f) selecting plants from said population having the TCB [trait] gene cluster for cross-incompability for further crossings and screenings until a line is obtained which is homozygous for the TCB [trait] gene cluster for cross-incompatibility to provide such a [trait] gene cluster in an inbred to be used in hybrid combination.

40. (Amended). The process of claim 39 wherein [the first donor parental maize plant further comprises a gene cluster within its genome wherein] said gene cluster is located on the short arm of chromosome 4 between map units 40-85.

41. (Amended). The process of claim [40] 39 wherein the first donor parental maize plant further comprises a *Tcb* locus.

44. (Amended). The process of claim[s] 41 [or 43] wherein said *Tcb* locus comprises at least one gene which encodes for a pollen effect function in said plant.

47. (Amended). A cross-incompatible inbred maize plant comprising a TCB [trait] gene cluster produced by the process of claim 39.

48. (Amended). A process for producing a cross-incompatible hybrid maize plant exhibiting a TCB trait, the process comprising the steps of:

a) crossing the inbred maize plant of claim [39] 47 with a second maize inbred line comprising genes encoding desirable phenotypic traits to produce a segregating plant population; and

b) collecting the hybrid seed resulting from the cross in step a.

49. (Amended). The process of claim 48 wherein the second maize inbred line is cross-incompatible and comprises a TCB [trait] gene cluster within its genome.

59. (Amended). A process for selecting a cross-incompatible hybrid maize plant [containing] exhibiting a TCB trait, the process comprising the steps of:

analyzing each plant from a population of hybrid maize plants for [the] those plants exhibiting a TCB trait.

64. (Amended). The process of claim[s] 61 [or 63] further comprising the step of analyzing the DNA of each plant from said population for at least one gene which encodes for a pollen effect function in said plant.

67. (Amended). A process of controlling hybridization of a maize plant in a field, the process comprising the step of planting in a field a cross-incompatible maize plant of claims 1, 4, 5, [7, 8,] 15, 16, 17, [19, 20,] 27, 34, 35, [37, 38,] 47, 50, [58,] or 66.

68. (Amended). A process of controlling hybridization of inbred maize plants [in a field] being used in hybrid seed production, the process comprising the step of planting in a field [being used for hybrid seed production,] at least one cross-incompatible inbred maize plant of claims 4, [8,] 16, [20,] 34, [38,] or 47 [or 58] with at least one second inbred maize plant and crossing the cross-incompatible inbred maize plant with the second maize inbred maize plant to produce a hybrid maize seed.

Please add new claims 69-72 as follows:

69. (New). Inbred maize seed designated W22-TCB having A.T.C.C. No. PTA-

1601.

70. (New). A cross-incompatible maize plant produced by growing the seed of claim 69.

71. (New). Pollen of the plant of claim 70.

72. (New). An ovule of the plant of claim 70.

REMARKS

Reconsideration of the above-identified application in view of the aforementioned amendments and following arguments is respectfully requested.

Claims Please amend claims 1, 2, 9, 12, 13, 14, 15, 21, 25, 27, 28, 32, 39, 40, 41, 44, 47, 48, 49, 59, 64 and 67-68 have been amended. No new matter has been added as a result of these amendments. New claims 69-72 have been added. No new matter has been added as a result of the addition of these claims.

Claims 67-68 were objected for depending upon non-elected claims. Claims 67-68 have been amended to remove the reference to all non-elected claims. Applicants reserve the right to pursue these claims in one or more divisional applications.

Claims 2, 21, 28, 40, 47 and 49 were amended to make the language of these claims consistent with the language of the claims from which each of these claims depend or relate back to.

Claim 9 was amended to make this claim an independent claim and to further describe the claimed invention.

Claims 12-14 and 41 were amended to change the identification of the claim from which each of these claims depended.

Claims 15 and 39 were each amended to further describe the claimed invention.

Claim 59 was amended to correct a typographical error. Applicants have corrected the recitation of "the a" as kindly pointed out by the Examiner.

Claims 14, 26, 33, 45 and 65 were objected to under 37 CFR Section 1.75(c) as

being in improper form because a multiple dependent claim cannot depend upon another multiple dependent claim. In response to this objection, Applicants have amended claims 13, 25, 32, 44, and 64 to remove the multiple dependency. In view of these amendments, Applicants submit that this rejection should be withdrawn.

Claims 1-5, 9-14, 27-35, 48-50 and 68 are rejected under 35 U.S.C. Section 112, second paragraph, as being indefinite. According to the Examiner, the dependent claims were included in this rejection. Specifically, claim 1 is rejected as being indefinite in its recitation of "TCB". According to the Examiner, the abbreviation, "TCB" does not adequately define what is intended. Applicants have amended claim 1 to recite that the abbreviation "TCB" refers to "Teosinte Crossing Barrier (TCB)" as suggested by the Examiner. Applicants thank the Examiner for this helpful suggestion.

Claim 27 is rejected as being indefinite in view of its recitation of "derived from". According to the Examiner, the degree of derivation was not specified. Applicants have deleted the word "derived" from this claim as suggested by the Examiner.

Claim 48 is rejected as being indefinite in its recitation of "the inbred maize plant of claim 39". The Examiner stated that this recitation is confusing since claim 39 is drawn to a process rather than a plant. Applicants have replaced "claim 39" with "claim 47" as suggested by the Examiner.

Claim 68 is rejected as being indefinite because the claim recited an intended use rather than a positive recitation of a required claim element. Applicants have amended claim 68 to recite positive method steps, such as "crossing the cross-incompatible inbred maize plant with another inbred maize plant to produce a hybrid maize plant" as suggested by the Examiner.

Claim 27 is rejected under 35 U.S.C. Section 112, first paragraph, as containing subject matter that was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and

use the invention. More specifically, the Examiner noted that Applicants have deposited a plant but that the specification did not state anything regarding the public availability of the deposit. The Examiner stated that since the deposit was made under the terms of the Budapest Treaty, then an affidavit or declaration by Applicants, or a statement by an attorney of record over his or her signature and registration number, stating that the specific strain had been deposited under the Budapest Treaty and that the strain will be irrevocably and without restriction or condition released to the public upon issuance of a patent, would satisfy the deposit requirement. In response to this rejection, Applicants herewith submit a signed declaration by the attorney of record stating that seeds of W22-TCB have been deposited under the Budapest Treaty and that these seeds will be irrevocably and without restriction or condition released to the public upon issuance of a patent. Claim 27 has also been amended to clarify that plant W22-TCB is grown from inbred maize seed deposited as ATCC No. PTA-1601.

Claims 1-5, 9-17, 21-35, 29-50 and 59-68 are rejected under 35 U.S.C. Section 112, first paragraph, as containing subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. According to the Examiner, the specification "only provides guidance for an inbred maize plant W22 containing a particular teosinte crossing barrier genetic factor from teosinte accession no. 48703 including *Tcb1* on chromosome 4 at a particular location, namely, W22-TCB deposited as ATCC No. PTA-1601, and methods for its use." Further, the Examiner states that "[N]o guidance is provided for the identification or characterization (even regarding its location on a particular region of a chromosome) of any other TCB trait or *Tcb* locus; or for the identification, isolation or characterization (regarding gene number or gene location) of any 'gene cluster', 'silk effect' gene(s), 'pollen effect' gene(s) or 'modifier gene(s)'" Applicants respectfully traverse this rejection.

The inquiry into whether the description requirement is met is determined on a case-by-case basis and is a question of fact. Section 2163.04 *Manual of Patent Examining Procedure* (8th Edition, August 2001). When a question regarding the adequacy of the

written description arises, the fundamental factual inquiry is whether the specification conveys to those skilled in the art, as of the filing date sought, that Applicant was in possession of the invention being claimed. Section 2163.02 *Manual of Patent Examining Procedure* (8th Edition, August 2001). Possession can be shown in a number of ways. For example, an Applicant can show possession by: (1) an actual reduction to practice of the claimed invention; (2) a clear depiction of the invention in detailed drawings or in structural chemical formulas which permit a person skilled in the art to clearly recognize that applicant had possession of the claimed invention; or (3) any description of sufficient, relevant, identifying characteristics so long as a person skilled in the art would recognize that the inventor had possession of the claimed invention. Section 2163 *Manual of Patent Examining Procedure* (8th Edition, August 2001).

A description as filed is presumed to be adequate, unless or until sufficient evidence or reasoning to the contrary has been presented by the Examiner to rebut the presumption. Section 2163.04 *Manual of Patent Examining Procedure* (8th Edition, August 2001). The Examiner, therefore, must have a reasonable basis to challenge the adequacy of the written description. *Id.* The Examiner has the initial burden of presenting by a preponderance of the evidence why a person skilled in the art would not recognize in an applicants disclosure a description of the invention as defined by the claims. *Id.*

Applicants respectfully submit that the specification as filed is adequate and reasonably conveys to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The Examiner states that the specification does not provide any guidance for the identification or characterization of any other TCB trait or *Tcb* locus, or for the identification, isolation or characterization of any "gene cluster", "silk effect" gene(s), "pollen effect" genes or "modifier genes". Applicants respectfully direct the Examiner's attention to pages 15-16 and 18 of the specification. Specifically, on page 15, lines 10-15, the TCB trait is described as comprising a gene cluster that is expressed dominantly and located on the short arm of chromosome 4, between map units 40-85 (See Figure 1). Moreover, as described on page 18, lines 14-20, a number of molecular markers, including those between phi021 and nc005 shown in Fig. 1 and the

markers including and between umc 1117 and bnlg 490 shown in Fig. 3B can be used to identify this gene cluster.

As further described on page 15, lines 19-20, the *Tcb* locus is located at about 6 map units (or centiMorgans) distal to the *sugary1* marker on chromosome 4S, about 40 map units (or centiMorgans) from the *Ga1* marker. As the specification further describes, the *Tcb* locus contains genes responsible for the silk effect function and pollen effect function. The characteristics of the gene(s) that encode the "silk effect" and "pollen effect" are described in detail on page 15, lines 21 – page 16, lines 9-15.

With respect to the "modifier genes", the specification on page 16, lines 23-30 and page 17, line 1, describes the modifier genes and how such genes can be located. In fact, the specification on page 16, lines 25-26 describes at least one modifier gene that modifies the effect of the *Tcb* locus and is located near the *Tcb* locus in the direction of the *Gal1* marker (see Fig. 1).

Applicants submit that plants regenerated from the seeds of inbred line W22-TCB along with the description on pages 15 and 16 of the specification, as well as the molecular markers described on page 18 of the specification can all be used by a person skilled in the art to identify other TCB traits, *Tcb* loci and modifier genes using routine techniques known in the art.

In view of the aforementioned arguments, Applicants submit that the Examiner has not met his burden of presenting by a preponderance of the evidence that a person skilled in the art would not recognize in Applicants disclosure, a description of the invention as defined by the claims. Therefore, the rejection of claims 1-5, 9-17, 21-35, 29-50 and 59-68 under 35 U.S.C. Section 112, first paragraph should be withdrawn.

Claims 1-5, 9-17, 21-35, 39-50 and 59-68 are rejected under 35 U.S.C. Section 112, first paragraph, as only being enabling for claims limited to deposited inbred maize line W22-TCB. According to the Examiner, the specification does not reasonably provide

enablement for claims broadly drawn to any maize plant containing any TCB trait, any *Tcb* locus, any "modifier gene", any "pollen effect" gene, or any "silk effect" gene or methods of using them. The Examiner states that "[N]o guidance is provided for the identification or characterization (even regarding its location on a particular region of a chromosome) or any other TCB trait or *Tcb* locus; or for the identification, isolation or characterization (regarding gene number or gene location) of any 'gene cluster', 'silk effect' gene(s), 'pollen effect' gene(s) or 'modifier gene(s)'". The Examiner further stated that "no guidance was provided for the design of molecular probes or other techniques for the analysis of DNA containing non-exemplified and/or uncharacterized genes or genetic factors involved in the TCB trait." The Examiner cited Ashman and Bianchi et al. to support his argument that the identification and localization of genes involved in cross-incompatibility in maize is unpredictable. Additionally, the Examiner states that molecular marker-based and/or linkage analysis-based localization of genes in maize is generally unpredictable. The Examiner cites Goldman et al. as teaching that different linkage maps are generated when different breeding lines are used as parents and that inconsistent results were observed regarding the correlation of particularly quantitatively inherited traits analogous to the "pollen effect", "silk effect" or "modifier genes". Applicants respectfully traverse this rejection.

In 1965, Jimenez and Nelson (in *J. Hered.* 56:259-263 (1965)) described a new gametophyte factor isolated from a popcorn variety of White Rice (4519-4). According to Jimenez and Nelson, this factor was located on chromosome 4 but was not an allele of *Ga1*. Jimenez and Nelson assigned this allele to *ga9,* a new fourth chromosome locus that was the same distance from *su1* as *ga1,* but on the other side of *su1*. Ashman was unable to verify the *ga9* locus on the long arm of chromosome 4. Rather, the data obtained by Ashman showed that this gametophyte factor was another allele of *Ga1*. Later, Nelson, in *The Maize Handbook* (1994) on page 500 states the following regarding this work by Ashman:

> "Jimenez and Nelson erroneously assigned this allele to *ga9*, a new fourth chromosome locus, which was the same distance from *su1* as *ga1* but on the other side of *su1*. Ashman (1981) showed that this was another allele of *ga1*, and my own unpublished data agree with this correction."

Applicants submit that all the article by Ashman teaches is that Jimenez and Nelson made a mistake in the mapping of one gametophyte factor. This mistake was uncovered by Ashman and was later confirmed by Nelson. Such mistakes are a part of the reality of science and occur from time-to-time. However, the Examiner is interpreting this single mistake that was uncovered by Ashman too broadly in making his overarching and overly generalized statement that this reference supports his argument that the identification of localization of genes involved in cross-incompatibility in maize is unpredictable. Applicants submit that this is an unduly broad interpretation of Ashman.

Additionally, the Examiner cited Bianchi et al. to further support his argument. Bianchi et al. examined the gametophyte factor *Ga8* located on chromosome 9. The system examined by Bianchi et al. is not a cross-incompatibility system but involves pollen distortion (meaning differences in efficiency of pollen transmission). Bianchi et al. reported that the map distance between *sh* and *wx* was reported to be 30 map units but that the map distance in their genetic stock was actually closer to 25.

Bianchi et al. was published in 1970, almost twenty-three (23) years ago. Applicants submit that the level of ordinary skill in identifying and localizing genes involved in certain traits is much higher now than it was in 1970. Additionally, it is now accepted that although gene order is constant and that the levels of recombination upon which map distances are based differ somewhat from strain to strain. This concept is further discussed below in connection with the Goldman et al. article cited by the Examiner.

Next, the Examiner cites Goldman et al. to support his argument that marker-based and/or linkage analysis-based localization of genes in maize is unpredictable. It is Applicants position that Goldman et al. do not teach that marker-based and/or linkage analysis based localization of genes in maize is unpredictable. Rather, Applicants submit that Goldman et al. teach the following: (1) that genetic mapping studies have revealed a general pattern of stability for gene order of RFLP marker loci in different maize crosses; and (2) that the map distance of marker loci has been shown to vary (See page 909 of Goldman et al.). Specifically, Goldman et al. state, that "[I]t is therefore **possible** some

RFLP marker loci **may** reside in different chromosomal locations in these genetic stocks than described in other mapping efforts. However, genetic mapping investigations in Illinois Long Term Selection Oil Strains (T. Berke and T. Rocheford, 1993, unpublished data) have revealed location of RFLP marker loci in these strains is consistent with locations reported by Coe (1992)" (Goldman et al., page 909, emphasis added). Clearly, as these statements reveal, Goldman et al. do not teach that marker-based and/or linkage analysis-based localization of genes in maize is unpredictable, but rather that on occasion, map distances of various loci have been shown to vary in different genetic stocks. More importantly, however, Goldman et al. teach that the gene order of RFLP marker loci in different maize crosses is stable. Because the order of the genes is constant, one skilled in the art can determine the map distances of loci in varying genetic sources using the knowledge of the gene order, currently available genetic maps, and routine techniques known in the art.

The test of enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent application coupled with information known in the art without undue experimentation (*Manuel of Patent Examining Procedure*, 8th Edition, August 2001). Applicants have described in their specification how the TCB trait comprises a TCB gene cluster that is expressed dominantly and located on the short arm of chromosome 4, between map units 40-85 (See Figure 1). The TCB gene cluster further includes a *Tcb* locus. Moreover, as described in the specification on page 18, lines 14-20, a number of molecular markers, including those between phi021 and nc005 shown in Fig. 1 and the markers including and between umc 1117 and bnlg 490 shown in Fig. 3B can be used to identify the *Tcb* locus. Additionally, as further described in the specification on page 15, lines 19-20, the *Tcb* locus is located at about 6 map units (or centiMorgans) distal to the *sugary1* marker on chromosome 4S, about 40 map units (or centiMorgans) from the *Ga1* marker. The *Tcb* locus contains genes responsible for the silk effect function and pollen effect function. The characteristics of the gene(s) that encode the "silk effect" and "pollen effect" are described in detail on page 15, lines 21 – page 16, lines 9-15.

With respect to the "modifier genes", the specification on page 16, lines 23-30 and page 17, line 1, describes the modifier genes and how such genes can be located. In fact,

the specification on page 16, lines 25-26 describes at least one modifier gene that modifies the effect of the *Tcb* locus and is located near the *Tcb* locus in the direction of the *Ga1* marker (see Fig. 1).

Applicants submit that plants grown from the seeds of inbred line W22-TCB along with the description on pages 15 and 16 of the specification, as well as the molecular markers described on page 18 of the specification can all be used in combination by those skilled in the art to identify other plants that exhibit TCB traits, TCB gene clusters, *Tcb* loci and modifier genes using routine experimentation in the art.

The Examiner simply has not provided any evidence that one reasonably skilled in the art could not make or use the presently claimed invention based upon the specification as filed without undue experimentation. Thereupon, in view of the aforementioned arguments, Applicants submit that this rejection should be withdrawn.

In view of the aforementioned arguments, Applicants submit that the rejection of claims 1-5, 9-17, 21-35, 39-50 and 59-68 under 35 U.S.C. Section 112, first paragraph should be withdrawn.

Claims 1-5, 9, 14-17, 21, 26, 39-40, 45-50, 59 and 67-68 are rejected under 35 U.S.C. Section 102(b) as being anticipated by Rashid et al. Applicants respectfully traverse this rejection.

Anticipation under 35 U.S.C. Section 102(b) requires that each and every element of the claimed invention be disclosed in a single prior art reference. Rashid et al. disclose a cross-incompatibility system that is controlled by three recessive loci. The first locus, *cif*, controls the incompatibility reaction in the female parent plant. The other two loci (*cim1* and *cim2*) control the reaction in the male parent plant. According to Rashid et al., the cross is incompatible only when the female parent is homozygous recessive for the *cif* locus and when the male parent is homozygous recessive for both the *cim1* and the *cim2* loci. Rashid et al. further disclose that *cif* and *cim1* and *cim2* are not allelic and are separate genes.

The cross-incompatibility system disclosed by Rashid et al. is a different system than the cross-incompatibility system of the present invention. The cross-incompatibility system of Rashid et al. is controlled by three recessive loci. In order for the system to be effective, the female parent must be homozygous recessive for the *cif* locus and the male parent must be homozygous recessive for both the unlinked *cim1* and the *cim2* loci. Additionally, in Rashid et al., the incompatibility of the silks is conferred by the recessive action of the gene. Also, two (2) loci govern the behavior of the pollen.

The TCB trait of the present invention is encoded by a gene cluster that includes the *Tcb* locus and one or more modifier genes that modify the effect of the *Tcb* locus. The *Tcb* locus contains at least one gene(s) encoding the silk effect and/or pollen effect functions. The TCB trait of the present invention is not controlled by three, unlinked loci, but by a complex of linked genes. Additionally, the *Tcb* silk effect is not conferred by the recessive action of a gene. Therefore, the TCB trait and the cross-incompatibility traits described by Rashid et al. are not the same. Thereupon, the rejection of the claims as being anticipated by Rashid et al. should be withdrawn.

Claims 1-5, 9, 14-17, 21, 26, 39-40, 59 and 67-68 are rejected under 35 U.S.C. Section 102(b) as being anticipated by Nelson.

Anticipation under 35 U.S.C. Section 102(b) requires that each and every element of the claimed invention be disclosed in a single prior art reference. Nelson is a chapter from *The Maize Handbook*. In this chapter, Nelson reviews various gametophyte factors in maize. The Examiner refers to various paragraphs in Nelson. Specifically, the paragraph bridging pages 496-497, the bottom two paragraphs on page 499, the top paragraph on page 500, and the second full paragraph on page 501. Applicants will now address the teachings disclosed in these paragraphs.

The paragraph bridging pages 496-497 discusses the crosses (specifically those involving crosses between Rice Popcorn and sweet corn (*sugary1*)) that lead to the

identification of the fourth chromosome locus, *gametophyte factor1 (ga1)*. *Gametophyte factor1* is different from the TCB trait. The recessive allele, ga1, at the gametophyte *factor1* locus is typically found in dent corn. Specifically, *ga1* pollen is capable of fertilizing other dent corn that contains this locus. However, *Ga1-s/Ga1-s* popcorn is not fertilized by *ga1* pollen. However, *Ga1 ga1* heterozygotes are usually fertilized by *ga1 ga1* homozygotes.

The second to last paragraph on page 499 of Nelson discusses how the inability of *Ga1-s/Ga1-s* plants to set seed with *ga* pollen can be exploited to protect maize being grown for special uses from contamination by dent (*ga*) pollen during hybrid seed production and the production of the crop itself. The last paragraph on page 499 that is carried over on to page 500 discusses the work described by Nelson in *Genetics* 37:101-124 (1952). This paragraph discusses the experiments conducted by Nelson relating to cross-sterility among popcorns using a series of reciprocal crosses. Nelson employed 10 popcorn inbreds from a number of varieties and a dent inbred, *Hy*, that was known not to be able to effect fertilization on several popcorn inbreds. What is not reported here is that in this work Nelson found that the success of the cross depended on whether or not *Ga1-s* was present as homozygote or a heterozygote. Specifically, Nelson found that when *Ga1-s* was present as a homozygote, the cross failed; but if present as a heterozygote, that the success of the cross was variable (See Evans et al., *Theor. Appl. Genet.*, 103:259-265, 259 (2001)).

In the second full paragraph on page 501 Nelson discusses the work of Kermicle et al. reported in *Maydica*, 35:399-408 (1990). As discussed below, Kermicle et al. discuss the phenotype referred to as teosinte incompatibility or "TIC". As shown in Fig. 4, the TIC phenotype includes TIC-CP1 (*Gal-m*) (the pollen effect function of *Ga1-s*), TIC-CP2 as well as some additional functions that were undefined. TIC-CP2 arose as a rare variant from TIC that lost the female function of pollen rejection. Maize plants containing TIC-CP2, when used as a male parent, pollinated maize plants containing TIC and dent (*ga1*) but not pop (*Ga1-s*) lines.

In contrast, the present invention relates to the maize plant containing a TCB trait. The TCB trait of the present invention is encoded by a gene cluster that includes the *Tcb*

locus and one or more modifier genes. The *Tcb* locus contains at least one gene(s) encoding the silk effect and/or pollen effect functions, including TIC-CP2. Maize plants containing TCB gene cluster and exhibit the TCB trait are able to reject pollen from various maize plants. The TCB trait does not include TIC-CP1 that is a component of TIC.

Therefore, in view of the aforementioned arguments, Applicants submit that this rejection should be withdrawn.

Claims 1-5, 9-17, 21-35, 39-50 and 59-66 are rejected under 35 U.S.C. Section 102(b) as being anticipated by Kermicle et al. (1990). Applicants respectfully traverse this rejection.

Anticipation under 35 U.S.C. Section 102(b) requires that each and every element of the claimed invention be disclosed in a prior art reference. Kermicle et al. discuss the phenotype referred to as teosinte incompatibility or "TIC". The TIC phenotype is different from the TCB trait. As shown in Fig. 4, the TIC phenotype includes TIC-CP1 (*Gal-m*) (the pollen effect function of *Ga1-s*), TIC-CP2 as well as some additional functions that were undefined. TIC-CP2 arose as a rare variant from TIC that lost the female function of pollen rejection. Maize plants containing TIC-CP2, when used as a male parent, pollinated maize plants containing TIC and dent (*ga1*) but not pop (*Ga1-s*) lines.

In contrast, the present invention relates to the maize plant containing a TCB trait. The TCB trait of the present invention is encoded by a TCB gene cluster that includes the *Tcb* locus and one or more modifier genes. The *Tcb* locus contains at least one gene(s) encoding the silk effect and/or pollen effect functions, including TIC-CP2. Maize plants containing TCB are able to reject pollen from various maize plants. The TCB trait does not include TIC-CP1 that is a component of TIC.

In view of the aforementioned arguments, Applicants submit that this rejection should be withdrawn.

Claim 66 is rejected under 35 U.S.C. Section 102(b) as being anticipated by, or in the alternative, under 35 U.S.C. Section 103(a) as obvious over each of Rashid et al. and Nelson.

As discussed previously, the cross-incompatibility system disclosed by Rashid et al. is a different cross-incompatibility system than the cross-incompatibility system of the present invention. The cross-incompatibility system of Rashid et al. is controlled by three unlinked loci. In order for the system to be effective, the female parent must be homozygous recessive for the *cif* locus and the male parent must be homozygous recessive for both the *cim1* and the *cim2* loci. Additionally, in Rashid et al., the incompatibility of the silks is conferred by the recessive action of the gene. Also, two (2) loci govern the behavior of the pollen.

As also discussed previously, Nelson is a chapter from a book that reviews various gametophyte factors in maize.

Neither Rashid et al. or Nelson individually anticipate claim 66 nor does the combination of these two references disclose or suggest a cross-incompatible hybrid maize plant comprising a TCB trait produced by the process of claim 60. More specifically, the TCB trait of the present invention is encoded by a TCB gene cluster that includes the *Tcb* locus and one or more modifier genes that modify the effect of the *Tcb* locus. The *Tcb* locus contains at least one gene(s) encoding the silk effect and/or pollen effect functions. The TCB trait of the present invention is not controlled by three, unlinked loci, but by a complex of linked genes. The *Tcb* silk effect is not conferred by the recessive action of a gene. Also, maize plants exhibiting the TCB trait are able to reject pollen from various maize plants. The TCB trait does not include TIC-CP1 that is a component of TIC.

Therefore, in view of the aforementioned arguments, Applicants submit that this rejection should be withdrawn.

Claims 1-5, 9-17, 21-35, 39-50 and 59-68 are rejected under 35 U.S.C. Section

103(a) as being unpatentable over Kermicle et al. (1990) taken with Nelson. Applicants respectfully traverse this rejection.

Both Kermicle et al. (1990) and Nelson have been discussed previously. Kermicle et al. and Nelson discuss the phenotype referred to as teosinte incompatibility or "TIC". The TIC phenotype is different from the TCB trait. As shown in Fig. 4, the TIC phenotype includes TIC-CP1 (*Gal-m*) (the pollen effect function of *Ga1-s*), TIC-CP2 as well as some additional functions that were undefined. TIC-CP2 arose as a rare variant from TIC that lost the female function of pollen rejection. Maize plants containing TIC-CP2, when used as a male parent, pollinated maize plants containing TIC and dent (*ga1*) but not pop (*Ga1-s*) lines.

In contrast, the present invention relates to the maize plant exhibiting a TCB trait. The TCB trait of the present invention is encoded by a TCB gene cluster that includes the *Tcb* locus and one or more modifier genes. The *Tcb* locus contains at least one gene(s) encoding the silk effect and/or pollen effect functions, including TIC-CP2. Maize plants containing TCB are able to reject pollen from various maize plants. The TCB trait does not include TIC-CP1 that is a component of TIC. The combination of Kermicle et al. (1990) and Nelson do not disclose or suggest a cross-incompatible maize plant comprising a TCB gene cluster, a process for obtaining an inbred maize plant, which when crossed with a second inbred maize plant, produces a hybrid maize plant which is cross-incompatible and contains a TCB gene cluster within its genome, a process for producing a cross-incompatible hybrid maize plant exhibiting a TCB trait, a process for selecting a cross-incompatible hybrid maize plant exhibiting a TCB trait, a process of controlling hybridization of a maize plant in a field comprising the step of planting in a field one of the previously described cross-incompatible maize plants, and a process of controlling hybridization of inbred maize plants in a field being used in hybrid seed production comprising the step of planting in a field being used for hybrid seed production one of the previously described cross-incompatible inbred maize plants.

Therefore, in view of the aforementioned arguments, Applicants submit that this

rejection should be withdrawn.

In connection with the 35 U.S.C. Section 103(a) rejections, Applicants wish to inform the Examiner that the subject matter of the claims of the present invention are all commonly owned.

Applicants submit that the claims are now in condition for allowance.

If any additional fees are incurred as a result of the filing of this paper, authorization is given to charge deposit account number 23-0785.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this Amendment is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, Washington D.C., 20231 on a March 25, 2003.

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